Medium Voltage Distribution

FLUSARC

36 kV - 630 A - 25 kA

Operation - Maintenance Instructions

Schneider Electric

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Introduction

Operations and maintenance may only be carried out by personnel who have received suitable authorisation for the operations and manœuvres they are responsible for performing.

If this is not the case, please refer to our Service Unit or Training Centre.

All locking−out operations must be performed according to the safety regulations currently being in force.

Our Service Unit: our specialists, and suitably adapted services

KJA8300

- Guarantee extension contracts in relation to the selling of new equipment,
- Supervision of HVA switchgear installations,
- Technical advice, diagnoses of the facilities, expertise,
- Maintenance contracts adapted to operational constraints,
- Systematic or conditional preventive maintenance,
- Corrective maintenance in case of partial or complete failure,
- Supply of spare parts.

Contact the Service Unit for diagnoses and advice:
Working hours
Phone No: +39 0377 417 351 7 **office hours**
Fax: +39 0377 451133

Overview

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Responsibilities

Our devices are quality controlled and tested at the factory in accordance with the standards and the regulations currently in force.
Apparatus efficiency and apparatus life depend on the compliance with the installation, commissioning and operation instructions described in this user manual.
Non respect of these instructions is likely to invalidate any guarantee.
Local requirements especially about safety and which are in accordance with the indications given in this document, must be observed.

Schneider Electric declines any responsibility for the consequences:
- due to the non respect of the recommendations in this manual which make reference to the international regulations in force.
- due to the non respect of the instructions by the suppliers of cables and connection accessories during installation and fitting operations,
- of any possible aggressive climatic conditions (humidity, pollution, etc.) acting in the immediate environment of the materials that are neither suitably adapted nor protected for these effects.

This user manual does not list the locking−out procedures that must be applied. The interventions described are carried out on de−energized equipment (in the course of being installed) or locked out (non operational).

Particular instructions for operations and interventions on energized equipment

When commissioning and operating the equipment under normal conditions, the General safety instructions for electrical applications must be respected, (protective gloves, insulating stool, etc.), in addition to standard operating instructions.

All manipulations must be completed once started.

The durations (for completing the operations mentioned) given in the maintenance tables are purely an indication and depend on on−site conditions.

Other technical notices to be consulted

- Products-L4-Flusarc-71897-V1-EN - Technical Characteristics

Tools (not supplied) required for the operations described in this user manual

- Flat, thin screwdriver (4) + medium
- Leather gloves

Symbols & conventions

Code for a product recommended and marketed by Schneider Electric

Tightening torque value.
Example: 1.6 daN.m

Mark corresponding to a key

Caution! Remain vigilant!
Precautions to be taken in order to avoid accidents or injury

Forbidden! Do not do it!
Compliance with this indication is compulsory, non compliance withthisstipulation may damage the equipment.

Information − Advice
Your attention is drawn to a specific point or operation.

Functional Interlocks

Functional mechanical interlocks

The FLUSARC switchgear is equipped with internal mechanical interlocks, called ”functional”, intended to avoid any kind of operating error.
It is necessary to know these interlocks in order to operate the switchgear correctly.

Interlocks for functions C and T1

Position		Switch disconnector	Earthing switch	Access to fuses or cables compartment
Switch disconnector	Closed Open	– –	Locked open Free	Not allowed Dependant on the position of the earthing switch
Earthing switch	Closed Open	Locked open Free	– –	Free Locked closed
Access to fuses	Open	Locked open	Locked closed	–
Access to cables compartment	Open	Locked open	■ Free for C function ■ Locked / closed for T1 function	–

Interlocks for function CB

Position		Circuit breaker	Disconnector	Earthing switch	Access cover to cables compartment
Circuit breaker	Closed	–	Locked (in closed position)	Locked open	Not allowed
	Open	–	Free	Dependant on the position of the disconnector	Dependant on the position of the earthing switch
Disconnector	Closed	Free	–	Locked open	Not allowed
	Open	Open	–	Free	Dependant on the position of the earthing switch
Earthing switch	Closed	Open	Locked open	–	Free
	Open	Dependant on the position of the disconnector	Free	–	Not allowed
Access panel to the cable compartment	Open	Open	Locked open	Free	–

Operating accessories

Reminder for Manual Operations

All movements of the lever must be frank and complete.

KJA0300

Circuit breaker closing spring loading lever (CB unit)

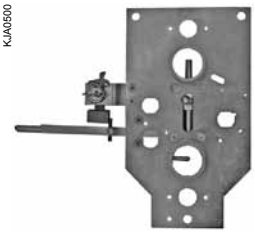
KJA0400

Operating lever

Key locks (optional)

They are used, in order to prevent any possible wrong operations during the FLUSARC switchgears use.

KJA0500

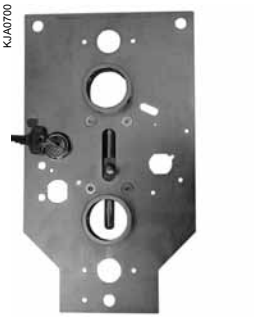


Closed earth free key (transformer protection unit)

KJA0600

Closed earth free key (line unit)

KJA0700



Open earth free key (line unit and transformer protection unit)

KJA0800

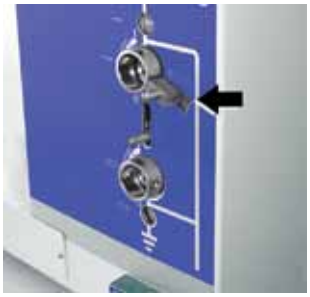
Open line free key (line unit and transformer protection unit)

Use of the C function

The procedures here following described refer to a line switchgear with manual closing and opening controls. Should those controls be electric and remotely controlled, it will be necessary to shift the interlock on the disconnector control operation, in order to insert the lever, and, if the remote control is present, it will be necessary to act on the relevant selector, in order to enable the operation on place.

- Disconnector control operation interlock device

KJB28KK



Opening the earthing switch

- Insert the operating lever into the earthing switch control.

KJA840O

KJA85KK

- Grasp the lever with both hands.
- Turn the lever counter clockwise, up to reach the end of stroke. The mimic diagram indicator will turn from the closed earth position to the open earth position
- Extract the operating lever.

Closing the earthing switch

Before closing the earthing switch, ensure there is no voltage across the voltage presence signal lamp.

- Act on the interlock, by shifting it upwards

KJA86KK

- Insert the operating lever into the earthing switch control.

KJA8700

Use of the C function (contd.)

KJA88KK

- Turn the lever clockwise, up to reach the end of stroke. The mimic diagram indicator will turn from the open earth position to the closed earth position
- Extract the operating lever.

Closing the switch disconnector

KJA89KK

- Act on the interlock, by shifting it downwards

KJA9000

- Insert the operating lever into the switch disconnector control.

KJA91KK

- Turn the lever clockwise, up to reach the end of stroke. The mimic diagram indicator will turn from the open line position to the closed line position
- Extract the operating lever.

Opening the switch disconnector

KJA9200

- Insert the operating lever into the switch disconnector control.

KJA93KK

- Grasp the lever with both hands.
- Turn the lever counter clockwise, up to reach the end of stroke. The mimic diagram indicator will turn from the closed line position to the open line position
- Extract the operating lever.

Use of the CB function

The procedures here following reported refer to a line switchgear with manual closing and opening controls. Should those controls be electric and remotely controlled, it will be necessary to act on the relevant selector, in order to enable the operation on place.

Opening the earthing switch

KJB1100

- Insert the operating lever into the earthing switch control.

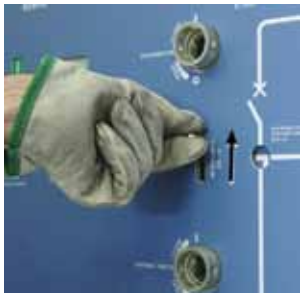
KJB12KK

- Grasp the lever with both hands.
- Turn the lever counter clockwise, up to reach the end of stroke. The mimic diagram indicator will turn from the closed earth position to the earth and line open position
- Extract the operating lever.

Closing the earthing switch

Before closing the earthing switch, ensure there is no voltage across the voltage presence signal lamp.

KJB13KK



- Act on the interlock, by shifting it upwards.

KJB1400

- Insert the operating lever into the earthing switch control.

KJB15KK

- Grasp the lever with both hands.
- Turn the lever clockwise, up to reach the end of stroke. The mimic diagram indicator will turn from the earth and line open position to the closed earth position
- Extract the operating lever.

Use of the CB function (contd.)

Closing the disconnector

KJB16KK

- Act on the interlock, by shifting it downwards.

KJB1700

- Insert the operating lever into the disconnector control.

KJB18KK

- Grasp the lever with both hands.
- Turn the lever clockwise, up to reach the end of stroke. The mimic diagram indicator will turn from the earth and line open position to the closed line position .
- Extract the operating lever.

Opening the disconnector

KJB19KK

- Act on the interlock, by shifting it leftwards.

KJB2000

- Insert the operating lever into the disconnector control.

KJB21KK

- Grasp the lever with both hands.
- Turn the lever counter clockwise, up to reach the end of stroke. The mimic diagram indicator will turn from the closed line position to the earth and line open position .
- Extract the operating lever.

Use of the CB function (contd.)

Closing the circuit breaker

The step here following described, relevant to the loading of the closing spring, must be carried out only if the CB switchgear isn't provided with a geared motor for loading the springs.

KJB22KK

- Load the closing spring, by inserting the lever into the relevant seat and by turning it counter clockwise, up to hear an acoustic click sound.

KJB23KK

- The charge/discharge spring indicator will get positioned with the arrow looking downwards.
- Extract the operating lever.

KJB24KK

- Close the circuit breaker, by acting on the closing pushbutton.

KJB25KK

- The "0" (open) position indicator will change to "I" (closed).

Open the circuit breaker

- Open the circuit breaker, by acting on the opening pushbutton.

KJB26KK

KJB27KK

- The indicator will change from position "I" (closed) to position "0" (open).

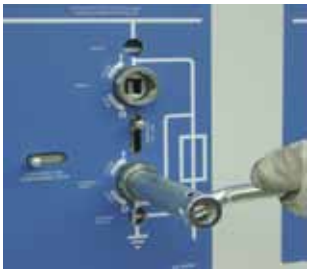
Use of the T1 function

Opening the earthing switch

KJA94KK

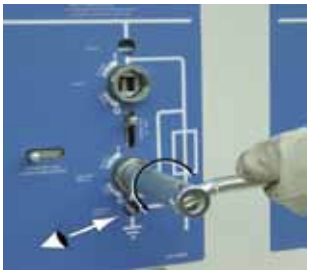
- Act on the door interlock, by shifting it leftwards.

KJA9700a



- Insert the operating lever into the earthing switch control.
- grasp the lever with both hands.

KJA95KK



- Turn the lever counter clockwise, up to reach the end of stroke. The mimic diagram indicator will turn from the closed earth position to the open earth position
- Extract the operating lever.

Closing the earthing switch

Before closing the earthing switch, ensure there is no voltage across the voltage presence signal lamp.

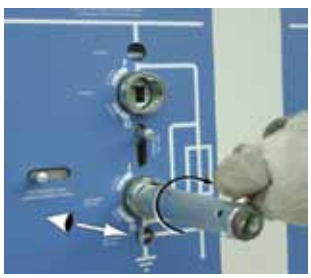
KJA96KK

- Act on the interlock, by shifting it upwards

KJA9700

- Insert the operating lever into the earthing switch control.

KJA98KK



- Grasp the lever with both hands.
- Turn the lever clockwise, up to reach the end of stroke. The mimic diagram indicator will turn from the open earth position to the closed earth position .
- Extract the operating lever.

Use of the T1 function (contd.)

Closing the switch disconnector

KJA98KK

- Act on the interlock, by shifting it downwards

KJB0100

- Insert the operating lever into the switch disconnector control.

KJB02KK

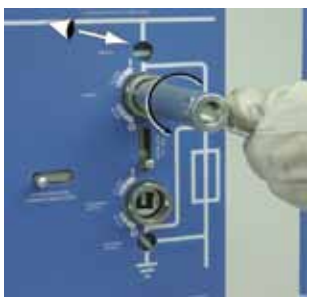
- Grasp the lever with both hands.
- Turn the lever clockwise, up to reach the end of stroke. The mimic diagram indicator will turn from the open line position to the closed line position
- Extract the operating lever.

Opening the switch disconnector

KJB0300

- Insert the operating lever into the switch disconnector control.

KJB04KK



- Grasp the lever with both hands.
- Turn the lever counter clockwise, up to reach the end of stroke. The mimic diagram indicator will turn from the closed line position to the open line position
- Extract the operating lever.

Maintenance

Levels of maintenance

Description	Levels
Operations recommended in the instructions manual "installation - operation - maintenance", carried out by suitably qualified personnel having received training allowing them to intervene whilst respecting the safety rules.	1
Complex operations, requiring specific expertise and the implementation of support equipment in accordance with Schneider Electric's procedures. These must be carried out by Schneider Electric or by a specialised technician trained by Schneider Electric when starting the procedures, with the appropriate specific equipment.	2
All preventive and corrective maintenance, all renovation and reconstruction work is carried out by Schneider Electric.	3

Preventive maintenance

Preventive Maintenance	Frequency	Levels		
Recommended operations	**6 years**	**1**	**2**	**3**
Verification of the presence and condition of accessories (levers, etc.)	■	■	■	■
Visual inspection of the exterior (cleanliness, absence of oxidation, etc.)	■	■	■	■
Cleaning of external elements, with a clean, dry cloth.	■	■	■	■
Verification of the positioning of the status indicators (open and closed)	■	■	■	■
Verification of the functioning of the mechanical control mechanism by making several manoeuvres	■	■	■	■
Visual surveillance of the general appearance of connections	■	■	■	■

Corrective maintenance

Corrective Maintenance	Levels		
Replacements or modifications	**1**	**2**	**3**
Replacement of the three fuses	■	■	■
Replacement of a signal lamp assembly	■	■	■

Replacement of the three fuses

Intervention	Busbar	Cables	Load Break Switch	Earthing switch
Normal	de-energized	de-energized	open	closed
Possible	energized	de-energized	open	closed

Locking out the Functional Unit

All locking out operations must be performed according to the particular rules for the network concerned.

Tools required:
- leather gloves
- Compartment key
- Small, flatheaded screwdriver
- Fuse holder cover lever.

Parts required:
- 3 fuses with the same reference (verify values in accordance with the transformer power)

Maintenance (contd.)

Before proceeding to carry out the operations for removing/installing the parts composing the FLUSARC switchgear, be sure that the voltage was cut out to the primary circuit and to the auxiliary one.

See the corresponding chapter in the Installation Manual for the characteristics of the fuses.

Replacement of a fuse

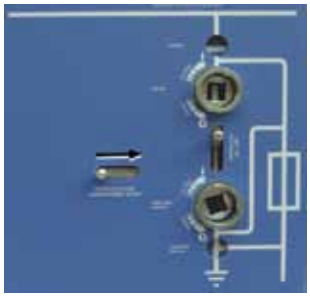
For an apparently single phase fault, it is imperative that all 3 fuses be replaced.

The body of a fuse can become very hot following a short circuit. Take standard precautions (leather gloves) before starting work.

Whenever changing or fitting a fuse, close the compartment immediately afterwards to avoid letting dust and humidity enter.

- Ensure that the function's earthing switch is closed.
- Act on the interlock of the door, by shifting it rightwards.

KJB05KK



- After unlocking the fuse compartment door handle by the key, rotate the handle itself counter clockwise.

KJB06KK

- Fully open the fuses compartment door, in order to restore the correct position of the rod placed on the fuses compartment door.

KJA7300

- Apply the lever to the fuseholder cover and screw into the two holes predisposed on the cover the two finned screws.

KJA74KK

Maintenance (contd.)

KJA756KK

- Turn the lever counter clockwise for a fourth of a revolution.

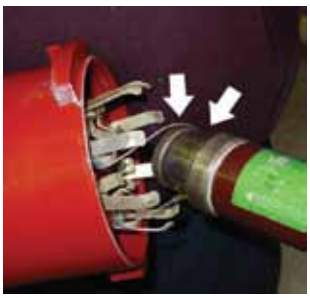
KJA768KK

- Extract the cover with the fuse.

KJA7700

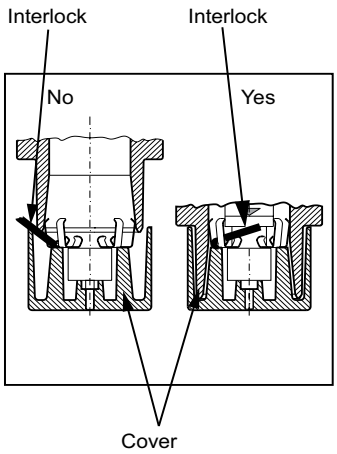
- Remove the fuse from the cover.

KJA788KK



- Insert the new fuse from the striker side on the cover, by paying attention that the fuse base gets into the spring acting as an interlock.

KJA6000



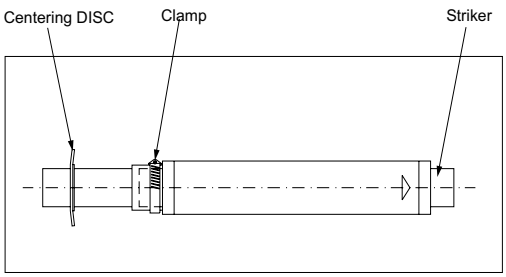
- The figure shows the correct positioning of the cover interlock.

Maintenance (contd.)

KJA7900

- From the fuse opposite side, insert the centering disc.

KJA6200



For fuses having a limited length, mount on the striker opposite side the extension, push it up to the end of stroke and tighten the clamp.

KJA76aKK

- Insert the cover with the fuse.

KJA75aKK

- Turn the lever clockwise and lock the cover.

KJA74KK

- Unscrew the wing screws and remove the lever from the cover.

KJA06AKK

- Close the fuse compartment door by rotating the handle clockwise and successively locking it by the key

Maintenance (contd.)

Replacement of a signal lamp assembly

Intervention	Busbar	Cables	Load Break Switch	Earthing switch
Normal	de-energized	de-energized	open	closed
Possible	energized	de-energized	open	closed

Locking out the Functional Unit

All locking-out operations must be performed according to the particular rules for the network concerned.

Tools required:

- –

Parts required:

- Signal lamp assembly.

Before proceeding to carry out the removal/installation operations of the parts composing the FLUSARC switchgear, be sure that the voltage was cut off both to the primary circuit and to the auxiliary one.

KJB0700

- To remove the signal lamp assembly take it by two hands and detach it from the switchgear. To install the new signal lamp assembly fit the terminals to the proper holes of the switchgear and press till complete insertion.

Spare parts

The spare part

Describes a part that is designed to replace a corresponding one with a view to reestablishing the original function.

The replacement of these parts can only be carried out by a person who is suitably qualified and trained for this operation.

For an explanation of the levels of maintenance, see Levels of maintenance.

Programmed replacement	Denomination	Replacement every	Levels		
			1	2	3
This concerns wearing parts, designed to be replaced after a predetermined number of uses. Use: Maintenance stock, necessary for optimum maintenance procedures every 6 years.	Fuses (by 3)	20 years	■	■	■

Non-Programmed replacement	Denomination	Levels		
		1	2	3
Describes spare parts whose replacement intervenes in the course of corrective maintenance.	Signal lamp assembly	■	■	■

Exceptional replacement	Denomination	Levels		
		1	2	3
Describes the spare parts or assemblies whose foreseeable service life is at least equal to that of the equipment. Use: Spare parts or sub-assemblies conserved in a safety stock.	Cable strapping	■	■	■
	Manometer	■	■	■
	Fuse electrode compartment key	■	■	■
	Circuit breaker closing spring loading lever	■	■	■
	Isolator control operating lever	■	■	■
	Upper protective box	■	■	■
	Protection relay	■	■	■
	Auxiliary contacts	■	■	■
	CB unit accessory plate	■	■	■
	CB unit rectifier bridge (if installed)	■	■	■
	CB unit operation counter	■	■	■
	CB unit geared motor for loading springs and relevant control card (antipumping device)	■	■	■
	C unit geared motor	■	■	■
	Control card of the C unit disconnector control	■	■	■
	Transmission chain of the C unit geared motor	■	■	■
	Toroidal current transformer	■	■	■
	Shunt opening release for transformer protection unit (T1)	■	■	■
	Fuse blown signaling microswitch	■	■	■
	CB unit shunt opening release kit	■	■	■
	CB unit shunt closing release kit	■	■	■
	CB unit demagnetization opening solenoid kit	■	■	■
	Motorization kit of the CB unit springs' loading device	■	■	■
	Motorization kit of the C unit disconnector control	■	■	■

Identification of materials

For all orders for spare parts, it is necessary to enclose the equipment characteristics form.

Storage conditions

The components should be stored away from dust, humidity or the sun. In order to facilitate the search, they must be marked by the Schneider Electric reference number.
Certain components are fragile, they should preferably be stored in their original packaging.

Cable testing

Preparation of the function

The operations indicated in this Paragraph must be exclusively carried out by specialist technicians, in full observance of all the rules in force about electrical safety.

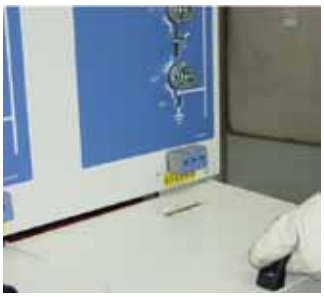
- Before proceeding to execute any operation on the apparatus, make sure that the vacuum circuit breaker is open and that the opening and closing springs inside the CB unit are unloaded, that the switch disconnectors are open and that the earthing switch is positioned on ”earth”.
- Before intervening on the apparatus, bring into safety conditions the installation part on which it is necessary to work

Implement lockout rules in accordance with the regulations specific to each network.

Cable testing with plugin ”T1” piece connectors

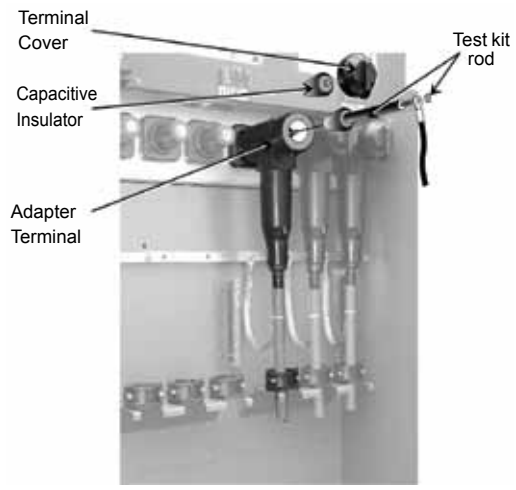
- Remove the lower protective box.

KJB0800



KJB0900

KJA70KK



- Remove the terminal cover from the adapter terminal.
- Unscrew the clamping screw of the capacitive insulator and remove it.
- Insert the kit rod for executing the test.
- Open the earthing switch and carry out the test by following the instructions given by the test kit supplier.
- Act in reverse sequence order for restoring the service.

Characteristics and Volumes of SF_6 gas

General characteristics

Type of Insulating Gas:
Sulphur Hexafluoride (SF_6) – iaw IEC 60376.

Each switchgear comprises a tank, filled with SF_6 gas, designed as a pressurised, sealed unit system in accordance with the requirements of IEC 60694.

During the expected operating life and under normal operating conditions the gas should not need topping up.
The GWP (Global Warming Potential) of the SF_6 gas is 22,200.

Never pierce the pressurised tank!

Never attempt to open the tank.

Filling pressure

At 20°C the filling pressure is 0.030 MPa.

KJA72aKK

Gas filling valve

FLUSARC functions

The loadbreak switches can only be manoeuvred whilst the needle is in the green sector (to the right) corresponding to ambient temperatures.

At the end of the equipment operational life

KJA81KK

FLUSARC CB

Safety instructions

Do not dismantle the mechanical control mechanism springs without releasing the device.

Never attempt to open the sealedtank of a Functional Unit.

Dismantling of the equipment service

Consult Schneider Electric for all decommissioning services.

- Remove all electrical equipment (coils, motors, etc.).
- On disassembly, the materials must be sorted and sent on via the appropriate recycling channels.

Notes

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